Amendments to the Specification:

Please replace paragraph [0084] with the following amended paragraph:

~~FIGS. 47A and 47B are a block diagram~~ FIGS. 47A(1), 47A(2), 47B(1), and 47B(2) are block diagrams of the control electronics according to the teachings of the invention.

Please replace paragraph [0090] with the following amended paragraph:

~~FIGS. 53 and 54~~ FIGS. 53(1), 53(2), and 54 are flow charts of the power up test sequence.

Please replace paragraph [0091] with the following amended paragraph:

~~FIG. 55 is a flow diagram~~ FIGS. 55.1 and 55.2 are flow diagrams representing the Power-Up sequence as it is implemented in Version 2 of the Electronics and Software.

Please replace paragraph [0095] with the following amended paragraph:

In the preferred embodiment, the central processing unit 20 is custom designed. The wiring diagrams for the CPU and support electronics is given in Microfiche Appendix E of U.S. Patent No. 5,475,610. (All references to a microfiche appendix herein will refer to those in U.S. Patent No. 5,475,610.) The actual control program is given ~~below~~ in Microfiche Appendix C of U.S. Patent No. 5,475,610 (Version 2 of the control program is included as Microfiche Appendix F of U.S. Patent No. 5,475,610). A block diagram of the electronics will be discussed in more detail below. In alternative embodiments, the central processing unit 20 and associated peripheral electronics to control the various heaters and other electromechanical systems of the instrument and read various sensors could be any general purpose computer such as a suitably programmed personal computer or microcomputer.

Please replace paragraph [0170] with the following amended paragraph:

After the required power to be applied to each of the three zones of the heater 156 is calculated, another calculation is made regarding the proportion of each half cycle of input power which is to be applied to each zone in some embodiments. In the preferred embodiment described below, the calculation mode is how many half cycles of the total number of half cycles which occur during a 200 millisecond sample period are to be applied to each zone. This process is described below in connection with the discussion of ~~FIGS. 47A and 47B (hereafter referred to as FIG. 47)~~ FIGS. 47A(1), 47A(2), 47B(1), and 47B(2), and the "PID Task" of the control software. In the alternative embodiment symbolized by FIG. 10, the computer calculates for each zone, the position of the dividing line 166 in FIG. 10. After this calculation is performed, appropriate control signals are generated to cause the power supplies for the multi-zone heater 156 to do the appropriate switching to cause the calculated amount of power for each zone to be applied thereto.

Please replace paragraph [0280] with the following amended paragraph:

Referring to ~~FIGS. 47A and 47B (hereafter FIG. 47), there is shown a block diagram~~ FIGS. 47A(1), 47A(2), 47B(1), and 47B(2), block diagrams are shown for the electronics of a preferred embodiment of a control system in a class of control systems represented by CPU block 10 in FIG. 1. The purpose of the control electronics of ~~FIG. 47~~ FIGS. 47A(1), 47A(2), 47B(1), and 47B(2) is, inter alia, to receive and store user input data defining the desired PCR protocol, read the various temperature sensors, calculate the sample temperature, compare the calculated sample temperature to the desired temperature as defined by the user defined PCR protocol, monitor the power line voltage and control the film heater zones and the ramp cooling valves to carry out the desired temperature profile of the user defined PCR protocol.

Please replace paragraph [0324] with the following amended paragraph:

After completing power-up self-checks shown in ~~FIGS. 53 and 54, and described more fully in Microfiche Appendix B,~~ FIGS. 53(1), 53(2), and 54, to assure the operator that the system is operating properly, the user interface of the invention offers a simple, top-level menu, inviting the user to run, create or edit a file, or to access a utility function. No programming skills are required, since pre-existing default files can be quickly edited with customized times and temperatures, then stored in memory for later use. A file protection scheme prevents unauthorized changes to any user's programs. A file normally consists of a set of instructions to hold a desired temperature or to thermocycle. Complex programs are created by linking files together to form a method. A commonly used file, such as a 4° C incubation following a thermocycle, can be stored and then incorporated into methods created by other users. A new type of file, the AUTO file is a PCR cycling program which allows the user to specify which of several types of changes to control parameters will occur each cycle: time incrementing (auto segment extension, for yield enhancement), time decrementing, or temperature incrementing or decrementing. For the highest degree of control precision and most reliable methods transferability, temperatures are setable to 0.1° C, and times are programmed to the nearest second. The invention has the ability to program a scheduled PAUSE at one or more setpoints during a run for reagent additions or for removal of tubes at specific cycles.

Please replace paragraph [0511] with the following amended paragraph:

When the power to the instrument is turned on or the software does a RESET, the following sequence takes place. Note: the numbers below correspond to numbers on the flow ~~chart in FIGS. 53 and 54~~ charts in FIGS. 53(1), 53(2), and 54. Transmit a Ctrl-G (decimal 7) character out the RS-

232 printer port. Poll the RS-232 port for at least 1 second and if a Ctrl-G is received, it is assumed that an external computer is attached to the port and all communication during the power-up sequence will be redirected from the keypad to the RS-232 port. If no Ctrl-G is received, the power-up sequence continues as normal. Check if the MORE key is depressed. If so, go straight to the service-only hardware diagnostics. The next 3 tests are an audio/visual check and cannot report an error: 1) the beeper beeps 2) the hot, cooling, and heating LEDs on the keypad are flashed 3) each pixel of the display is highlighted. The copyright and instrument ID screens are displayed as the power-up diagnostics execute. Should an error occur in one of the power-up diagnostics, the name of the component that failed is displayed and the keypad is locked except for the code `MORE 999` which will gain access to the service-only hardware diagnostics. Check channel 0 of the PPI-B device to see if the automated test bit is pulled low. If it is, run the,UART test. If the test passes, beep the beeper continuously. Start the CRETIN operating system which in turn will start up each task by priority level. Check a flag in battery RAM to see if the instrument has been calibrated. If not, display an error message and lock the keypad except for the code `MORE 999` which will gain access to the service-only calibration tests. Run a test that measures the voltage and line frequency and see if both these values match the configuration plug selected while calibrating the instrument. If not, display an error message and lock the keypad except for the code `MORE 999` which will gain access to the service-only calibration tests. Perform the heater ping test as described in the Install section. If the heaters are wired wrong, display an error message and lock the keypad except for the code `MORE 999` which will gain access to the service-only calibration tests. Check a flag in battery RAM to see if the instrument has been installed. If not, display an error message and lock the keypad except for the code `MORE 999` which will gain access to the install routine. If not in remote mode, check a flag in battery RAM to see if there was a power failure while the instrument

was running. If so, start a 4° C soak and display the amount of time the power was off for. Ask the user if they wish to view the history file which will tell them exactly how far along they were in the run when the power went off. If they select yes, they go straight to the user diagnostics. Beep the beeper and clear the remote mode flag so all communication now is back through the keypad. Check a flag in battery RAM to see if manufacturing wants their test program automatically started. If so, start the program running and reset the instrument after its done. Display the top level user interface screen. Electronics and Software Version 2

Please replace paragraph [0512] with the following amended paragraph:

Referring to ~~FIGS. 47A and 47b (hereafter FIG. 47), there is shown a block diagram~~ FIGS. 47A(1), 47A(2), 47B(1), and 47B(2), block diagrams are shown for the electronics of a preferred embodiment of a control system in a class of control systems represented by CPU block 10 in FIG. 1. The purpose of the control electronics of FIG. 47 is, inter alia, to receive and store user input data defining the desired PCR protocol, read the various temperature sensors, calculate the sample temperature, compare the calculated sample temperature to the desired temperature as defined by the user defined PCR protocol, monitor the power line voltage and control the film heater zones and the ramp cooling valves to carry out the desired temperature profile of the user defined PCR protocol.

Please replace paragraph [0541] with the following amended paragraph:

The logic equations for PAL 484 are ~~attached hereto as~~ set forth in Microfiche Appendix D of U.S. Patent No. 5,475,610. The logic equations for the address decoder 462, which is also programmable array logic, are also ~~attached hereto is~~ set forth in Microfiche Appendix D of U.S. Patent No. 5,475,610.

Please replace paragraph [0556] with the following amended paragraph:

After completing power-up self-checks shown in ~~FIGS. 53 and 54~~ FIGS. 53(1), 53(2), and 54, ~~and described more fully in Microfiche Appendix B,~~ to assure the operator that the system is operating properly, the user interface of the invention offers a simple, top-level menu, inviting the user to run, create or edit a file, or to access a utility function. No programming skills are required, since pre-existing default files can be quickly edited with customized times and temperatures, then stored in memory for later use. A file protection scheme prevents unauthorized changes to any user's programs. A file normally consists of a set of instructions to hold a desired temperature or to thermocycle. Complex programs are created by linking files together to form a method. A commonly used file, such as a 4° C incubation following a thermocycle, can be stored and then incorporated into methods created by other users. A new type of file, the AUTO file is a PCR cycling program which allows the user to specify which of several types of changes to control parameters will occur each cycle: time incrementing (auto segment extension, for yield enhancement), time decrementing, or temperature incrementing or decrementing. For the highest degree of control precision and most reliable methods transferability, temperatures are setable to 0.1° C, and times are programmed to the nearest second. The invention has the ability to program a scheduled PAUSE at one or more setpoints during a run for reagent additions or for removal of tubes at specific cycles.

Please replace paragraph [0561] with the following amended paragraph:

The various sections of the firmware will be described with either textual description, pseudocode or both. The actual source code in C language is ~~included below as~~ set forth in

U.S. Patent Application No. 10/691,186
Amendment dated June 22, 2005

Microfiche Appendix F of U.S. Patent No. 5,475,610.

Please replace paragraph [0736] with the following amended paragraph:

When the power to the instrument is turned on or the software does a RESET, the following sequence takes place. Note: the numbers below correspond to numbers on the flow ~~chart in FIG. 55~~ charts shown in FIGS. 55.1 and 55.2. Transmit a Ctrl-G (decimal 7) character out the RS-232 printer port. Poll the RS-232 port for at least 1 second and if a Ctrl-G is received, it is assumed that an external computer is attached to the port and all communication during the power-up sequence will be redirected from the keypad to the RS-232 port. If no Ctrl-G is received, the power-up sequence continues as normal. Check if the MORE key is depressed. If so, go straight to the service-only hardware diagnostics. The next 3 tests are an audio/visual check and cannot report an error: 1) the beeper beeps 2) the hot, cooling, and heating LEDs on the keypad are flashed 3) each pixel of the display is highlighted. The copyright and instrument ID screens are displayed as the power-up diagnostics execute. Should an error occur in one of the power-up diagnostics, the name of the component that failed is displayed and the keypad is locked to the customer. The code `MORE 999` gains access to the service-only hardware diagnostics. Check channel 0 of the PPI-B device to see if the automated test bit is pulled low. If it is, run the UART test. If the test passes, beep the beeper continuously. Start the CRETIN operating system which in turn will start up each task by priority level. Check a flag in battery RAM to see if the instrument has been calibrated. If not, display an error message and lock the keypad to the customer. The code `MORE 999` gains access to the service-only calibration tests. Run a test that measures the voltage and line frequency and see if both these values match the configuration plug selected while calibrating the instrument. If not, display an error message and lock the keypad to the customer. The code `MORE 999` gains

access to the service-only calibration tests. Check a flag in battery RAM to see if the instrument has been installed. If not, display an error message and lock the keypad to the customer. The code `MORE 999` gains access to the install routine. Check a flag in battery RAM to see if there was a power failure while the instrument was running. If so, start a 4° C soak and display the amount of time the power was off for. Ask the user if they wish to view the history file which will tell them exactly how far along they were in the run when the power went off. If they select yes, they go straight to the user diagnostics. Beep the beeper. Display the top level user interface screen.

Please delete the paragraph beginning at page 174, line 12 to page 231LLL.